

IN THE CLAIMS:

48. (Previously added) A method of recovering precious metal from a sulphide mineral slurry which contains the precious metal which includes the steps of:

- (a) subjecting the slurry in a reactor to a bioleaching process at a temperature in excess of 40°C;
- (b) supplying a feed gas which contains in excess of 21% oxygen by volume to the slurry;
- (c) controlling dissolved oxygen content in the slurry at a level of from $0.2 \times 10^{-3} \text{ kg/m}^3$ to $10 \times 10^{-3} \text{ kg/m}^3$ by controlling at least one of the following: oxygen content of the feed gas; supply rate of the feed gas; rate of feed of the slurry to the reactor; and
- (d) recovering precious metal from a bioleach residue of the bioleaching process.

49. (Previously added) The method according to claim 48 further including subjecting said bioleach residue to a liquid/solid separation step to produce residue solids and solution, and precious metal is recovered from the residue solids.

50. (Previously added) The method according to claim 49 further including recovering said precious metal from the residue solids by a cyanidation process.

51. (Previously added) The method according to claim 50 further including feeding off-gas from said reactor to said cyanidation process.

52. (Previously added) The method according to claim 48 further including recovering precious metal from the residue solids by at least one of the following: a resin-in-pulp process; a carbon-in-pulp process; and a carbon-in-leach process.

53. (Previously added) The method according to claim 49 further including subjecting said solution to a neutralisation step.

54. (Previously added) The method according to claim 53 further including adjusting the pH of said solution in the neutralisation step by the addition of at least one of the following: limestone and lime.

55. (Previously added) The method according to claim 53 wherein said neutralisation step is carried out to precipitate arsenic as ferric arsenate.

56. (Previously added) The method according to claim 53 further including feeding carbon dioxide, generated in the neutralisation step, to said slurry in said bioleaching process.

57. (Previously added) The method according to claim 48 wherein said precious metal is at least one of the following: gold or silver.

58. (Previously added) The method according to claim 48 wherein said feed gas contains in excess of 85% oxygen by volume.

59. (Previously added) The method according to claim 48 further including controlling a carbon content of said slurry.

60. (Previously added) The method according to claim 59 further including controlling said carbon content of said slurry by at least one of the following: adding carbon dioxide gas to said slurry; and adding other carbonaceous material to said slurry.

61. (Previously added) The method according to claim 48 further including controlling a carbon dioxide content of said feed gas in a range of from 0.5% to 5.0% carbon dioxide by volume.

62. (Previously added) The method according to claim 48 wherein said bioleaching process is carried out at a temperature in a range of from 40°C to 100°C.

63. (Previously added) The method according to claim 62 wherein said temperature is in a range of from 60°C to 85°C.

64. (Previously added) The method according to claim 48 further including bioleaching said slurry at a temperature of up to 45°C using mesophile microorganisms.

65. (Previously added) The method according to claim 64 wherein said microorganisms are selected from the genus groups comprising *Acidithiobacillus*; *Thiobacillus*; *Leptosprillum*; *Ferromicrobium*; and *Acidiphilium*.

66. (Previously added) The method according to claim 65 wherein said microorganisms are selected from the group comprising *Acidithiobacillus caldus*; *Acidithiobacillus thiooxidans* ; *Acidithiobacillus ferrooxidans*); *Acidithiobacillus acidophilus*; *Thiobacillus prosperus*; *Leptospirillum ferrooxidans*; *Ferromicrobium acidophilus*; and *Acidiphilium cryptum*.

67. (Previously added) The method according to claim 48 further including bioleaching said slurry at a temperature of from 45°C to 60°C using moderate thermophile microorganisms.

68. (Previously added) The method according to claim 67 wherein said microorganisms are selected from the genus group comprising *Acidithiobacillus*; *Acidimicrobium*; *Sulfobacillus*; *Ferroplasma* ; and *Alicyclobacillus*.

69. (Previously added) The method according to claim 68 wherein said microorganisms are selected from the group comprising *Acidithiobacillus caldus*; *Acidimicrobium ferrooxidans*; *Sulfobacillus acidophilus*; *Sulfobacillus disulfidooxidans*; *Sulfobacillus thermosulfidooxidans*; *Ferroplasma acidarmanus*; *Thermoplasma acidophilum*; and *Alicyclobacillus acidocaldrius*.

70. (Previously added) The method according to claim 63 further including bioleaching said slurry at a temperature of from 60°C to 85°C using thermophilic microorganisms.

71. (Previously added) The method according to claim 70 wherein said microorganisms are selected from the genus group comprising *Acidothermus*; *Sulfolobus*; *Metallosphaera*; *Acidianus*; *Ferroplasma*; *Thermoplasma*; and *Picrophilus*.

72. (Previously added) The method according to claim 71 wherein said microorganisms are selected from the group comprising *Sulfolobus metallicus*; *Sulfolobus acidocaldarius*; *Sulfolobus thermosulfidooxidans*; *Acidianus infernus*; *Metallosphaera sedula*; *Ferroplasma acidarmanus*; *Thermoplasma acidophilum*; *Thermoplasma volcanium*; and *Picrophilus oshimae*.

73. (Previously added) A precious metal recovery system which includes a reactor vessel, a source which feeds a precious bearing metal sulphide mineral slurry to said vessel wherein a bioleaching process is carried out at a temperature in excess of 40°C, an oxygen source which supplies oxygen in a form of oxygen enriched air or substantially pure oxygen to said slurry, a device which measures a dissolved oxygen concentration in said slurry in said vessel, a control mechanism whereby, in response to said measured dissolved oxygen concentration, a supply of oxygen from said oxygen source to said slurry is controlled to achieve a dissolved oxygen concentration in said slurry of from $0.2 \times 10^{-3} \text{ kg/m}^3$ to $10 \times 10^{-3} \text{ kg/m}^3$, and a recovery plant which recovers precious metal from a bioleach residue from said reactor vessel.

74. (Canceled)

75. (Canceled)